



## Surface water flooding risk to urban communities: Analysis of vulnerability, hazard and exposure

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### Abstract:

Developing appropriate responses to address and prevent surface water flooding requires an analysis of interactions between elements of a risk framework encompassing hazard, vulnerability and exposure. This paper explores the spatial distribution of surface water flooding, the vulnerability of communities to flooding, and the characteristics of physical environment and land use that affect people's exposure to flooding, particularly concerning green cover in Greater Manchester, UK. A set of 26 indicators known to influence the vulnerability of people to flooding was identified for spatial census units in Greater Manchester, and simplified with Principal Component Analysis to four underlying factors relating to material situation, diversity of communities and high proportion of children or elderly in the population. This was followed by an analysis of the presence and spatial distribution of surface water flooding areas, land use types, green cover and housing. Finally, the spatial associations between hazard, vulnerability and exposure were analysed. The results indicate that some of the most vulnerable people in Greater Manchester, namely the culturally diverse and materially deprived communities, are at high risk of flooding due to a convergence of factors related to socio-economic characteristics of the population, spatial distribution of the hazard, and the land use and housing types present in the area. Some adaptation responses tailored to the characteristics of the community and the environment they live in are discussed. (C) 2011 Elsevier B.V. All rights reserved.

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### Resource Description

#### Communication: ☒

resource focus on research or methods on how to communicate or frame issues on climate change;  
 surveys of attitudes, knowledge, beliefs about climate change

A focus of content

#### Communication Audience: ☒

audience to whom the resource is directed

Policymaker

#### Exposure : ☒

weather or climate related pathway by which climate change affects health

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Extreme Weather Event

**Extreme Weather Event:** Flooding

**Geographic Feature:** ☒

resource focuses on specific type of geography

Freshwater, Urban

**Geographic Location:** ☒

resource focuses on specific location

Non-United States

**Non-United States:** Europe

**European Region/Country:** European Country

**Other European Country :** United Kingdom

**Health Impact:** ☒

specification of health effect or disease related to climate change exposure

General Health Impact

**Mitigation/Adaptation:** ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

**Population of Concern:** A focus of content

**Population of Concern:** ☒

populations at particular risk or vulnerability to climate change impacts

Children, Elderly, Low Socioeconomic Status, Racial/Ethnic Subgroup

**Other Racial/Ethnic Subgroup:** Not specified

**Other Vulnerable Population:** People with pre-existing health conditions

**Resource Type:** ☒

format or standard characteristic of resource

Research Article

**Timescale:** ☒

time period studied

Time Scale Unspecified

**Vulnerability/Impact Assessment:** ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

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